



Research Article

MANAGEMENT OF WILT DISEASES IN COCONUT THROUGH INTEGRATED DISEASE MANAGEMENT STRATEGIES

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Abstract- Coconut is one the important cash crop grown by the farmers near the river beds and also using irrigation sources in Dharmapuri district. Though it has been grown for regular income, the productivity is very low compare to the other regions of the state. The unbalanced application of manures and fertilizers and improper pest and disease management are the major causes for the low yield. Among the diseases the *Ganoderma* wilt and stem wilt are the major disease and eriophiyd mite, redpalm weevil and rhinoceros beetles are the major pest's results in lower yield. The incidence of wilt disease led to death of 20-30 years old trees. Hence to demonstrate the integrated pest and disease management strategies among the farmers twenty demonstrations were conducted at Palacode and Moarppur blocks of Dharmapuri district for a period of two years. The management practices viz., sowing of green manure crop sunhemp @ 50 Kg/ha, insitu ploughing of sunhemp on 40-45th day after sowing, Neem cake 5 Kg/tree along with *Pseudomonas fluorescens* @ 5Kg/ha and *Trichoderma viride* @ 5Kg/ha, use of pheromone traps @ 12raps/ha for the management of redpalm weevil were demonstrated among the farmers. The percentage incidence of ganoderma wilt, stem wilt, redpalm weevil and mites were recorded at fortnight intervals after the application of treatments in the demonstration and control plots. The observations were continued for two-year period. The results of the above demonstrations revealed reduced incidence of diseases and increased yield. The demonstration plots recorded 11160 nuts/ha yield whereas the control field recorded 9360 nuts/ha. The yield increase was 16.1% in the demonstrated field. The incidence of ganoderma wilt, stem wilt, redpalm weevil and mite incidence in the demonstration plots were 7.22%, 5.41%, 7.91% and 50.50% and in the control plots were 13.11%, 12.22%, 12.77% and 75.54% respectively. The cost benefit analysis of present study recorded BCR and net return of 1.29 and Rs.13,800 in the demonstration and 1.17 and Rs. 6800 in the control plot. The above results revealed that the integrated management practices in the demonstration plots reduce the incidence of pest and diseases considerably.

Keywords- Coconut, stem wilt, sunhemp, *Pseudomonas fluorescens* & *Trichoderma viride*

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Introduction

Coconut is one of the remunerative crops grown in Dharmapuri district. Based on the availability irrigation source coconut has been grown either as sole crop or as bund crop. The crop contributes more than 8900 crores to the country's Gross Domestic Product apart from export earning of Rs 695 crores [1]. In India, it is grown in 939.90 million hectares with a production of 5840 million nuts and a productivity of 8165 nuts per hectares. The unbalanced application of manures and fertilizers and improper pest and disease management are the major causes for the low yield. Among the diseases the *Ganoderma* wilt and stem wilt are the major disease and eriophiyd mite, redpalm weevil and rhinoceros beetles are the major pest's results in lower yield. The stem wilt and root wilt are the most devastative in this region and many times the entire palm get collapsed if the disease was not cared in the initial period. The basal stem rot (BSR) disease is caused by *Ganoderma lucidum* (leys) Karsten. This disease is also known as "Thanjavur wilt" in Tamil Nadu. Butler, 1906 first reported this disease in palms [2]. The characteristic visual symptoms of the disease are yellowing of outer whorl leaves, yellowing gradually extend to the inner whorls. The affected leaves later droop down. The bearing capacity is gradually affected. The affected palm exhibit a dull brownish patch at the base of the trunk from which a brownish gum comes out and results in heavy button shedding. The fruiting body or 'anbae' of the fungus develops after the death of the palm. The poorly managed gardens are

most vulnerable for the disease [3]. In Dharmapuri district the plantations in the Palacode and Morappur blocks are severely affected and whereas the plantations in the Pappireddipatti blocks were moderately affected. Apart from this the eriophiyd mite, redpalm weevil and rhinoceros beetle infestation are also yield limiting in these regions. Hence to demonstrate the effect of integrated pest and disease management strategies among the growers the front line demonstrations were conducted in Dharmapuri district.

Materials and Methods

The front line demonstrations were conducted in ten farmers field in each year in Palacode and Morappur blocks of Dharmapuri district from 2013 to 2015. The survey regarding the incidence of pest and disease were conducted among the coconut growers in these blocks. The demonstration fields were selected based on the farmers feedback. The different management practices demonstrated (D) were,

- i. sowing of green manure crop sunhemp @ 50 Kg/ha
- ii. insitu ploughing of sunhemp on 40-45th day after sowing
- iii. Neem cake 5 Kg/tree along with *Pseudomonas fluorescens* @ 5Kg/ha and *Trichoderma viride* @ 5Kg/ha
- iv. use of pheromone traps @ 12 traps/ha for the management of redpalm weevil

v. Timely application fertilizers along with micro nutrients

Each demonstration was conducted at an area of 0.4 ha. To compare the effect of demonstration control plots (C) based on the farmer's management practices were maintained in area of 0.2 ha. All the agronomic practices were kept uniform for the demonstration and control plots. The sowing of sunhemp in the demonstration plants were done based on the rainfall or availability of water. The *insitu* ploughing was done on 40-45th day after applying the neem cake, *Pseudomonas fluorescens* and *Trichoderma viride*. The management of other pest and diseases were taken up in the demonstration field as and when they arise. The percentage stem wilt incidence in the demonstration and control fields are recorded based on the bleeding symptom in the trees. Apart from this the number trees affected by redpalm weevil, root wilt and eriophyid mite affected nuts were also recorded during the investigation. The eriophyid mite incidences were recorded based on the incidence of mite attack in the randomly selected ten trees. The above observations were recorded once in fortnight and the collected data were subjected for statistical analysis using statistical software SPSS 16.0.

Results and Discussion

The field demonstration results were presented in [Fig-1 to 6] and [Table-1]. The percent incidences of basal stem rot, root wilt and eriophyid mite *Aceria guerreronis* Keifer was recorded in all the farmers' fields. In location I the incidence of stem wilt was ranged between 2.35 to 7.74% in demonstration and 5.48 to 10.94% in the control plots [Fig-2]. The percentage stem wilt was ranged between 1.25 to 6.94 and 2.74 to 7.69% in the demonstration and control field respectively in location II [Fig-2]. Vijayaraghavan and Ramachandran, 1989 recorded 97.4 and 93.2 nuts/palm/year in the *Desmodium* and Sunhemp incorporated coconut fields respectively, compared to 68.6 nuts/palm/year in the control [4]. The application of heavy doses of farm yard manure or decomposed manure at 50 kg/palm/year along with 5 kg of neem cake effectively reduces the stem wilt incidence [5]. *T. harzianum* applied @ 50g per palm along with 5 kg neem cake or 50 kg of green leaves or 50 kg of farmyard manure reduced the basal stem rot disease [6]. In Areacanut the application of neem cake @ 2 kg/palm/year fortified with *T. viride* @ 100g/palm/year was the second best combination in reducing the *Ganoderma* wilt [7]. In the present study the reduction of basal stem rot may be due to the application of sunhemp, neem cake, *P. fluorescens* and *T. viride*.

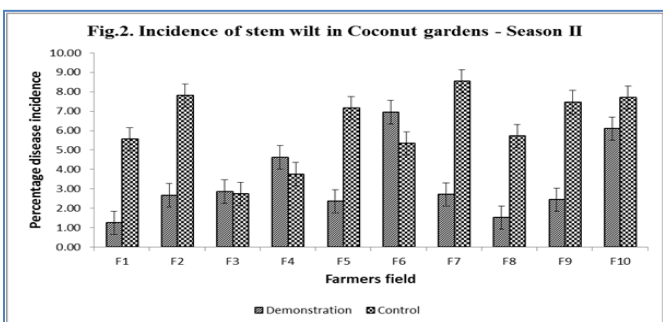
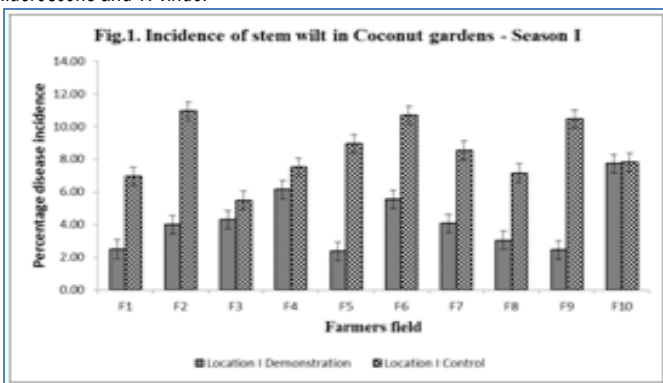
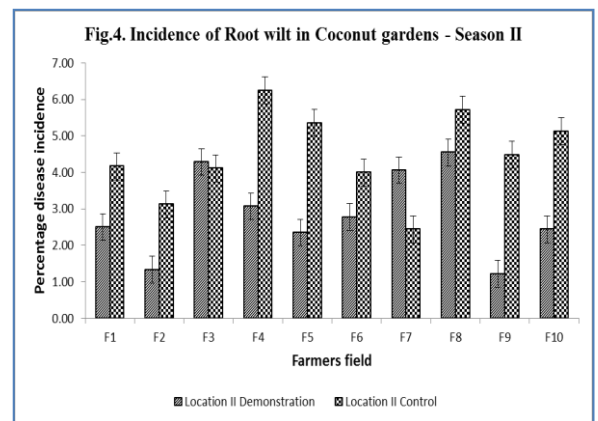
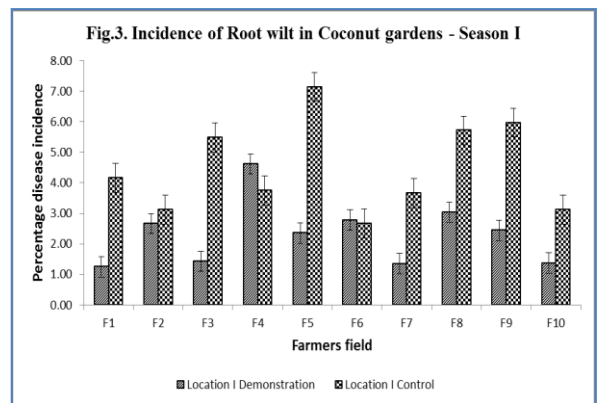


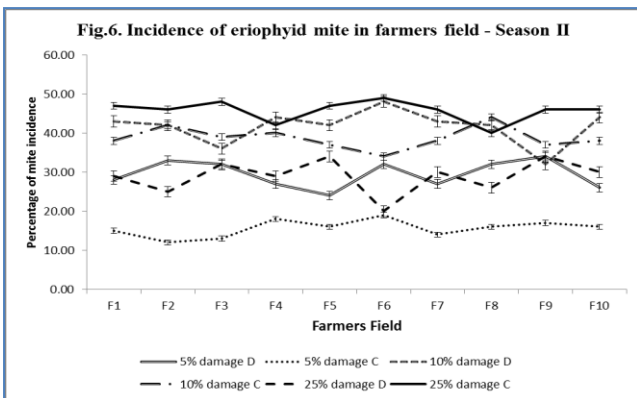
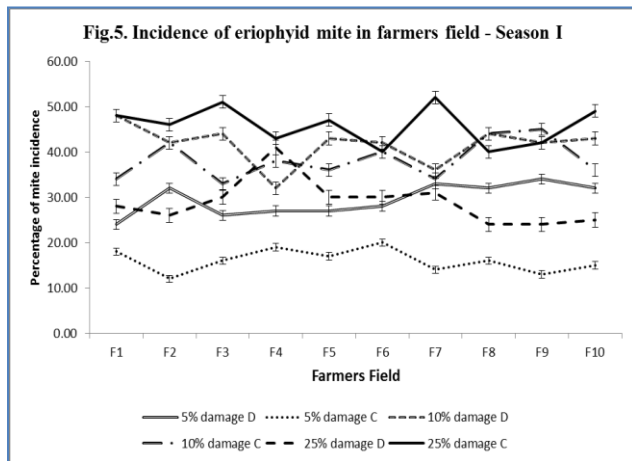
Table-1 Economic analysis of IPDM strategies demonstration in farmers field

Parameters	Demonstration	Control
Yield (nuts/ha)	11160	9360
Gross Cost (Rs)	43000	40000
Gross Return (Rs)	55800	46800
Net Return (Rs)	13800	6800
BCR	1.29	1.17

The incidence of root wilt was ranged between 1.25 to 4.62% in demonstration and 2.67 to 7.14 in control in location I [Fig-3]. In location II the percent incidence of root wilt was ranged between 1.22 to 4.55 and 2.44 to 4.55 in the demonstration and control respectively [Fig-4]. Dwivedi *et al.*, 1980 found that certain phenolic compounds, micronutrients, ascorbic acid markedly reduced the root wilt disease symptoms in coconut [8]. The micronutrients are essential for giving strength to leaves [9]. In the present investigation also the *insitu* ploughing of sunhemp along with organic amendments and bio control agents might have provided the required nutrients to the plants which ultimately reduced the incidence of root wilt disease.



The perianth mite incidence was recorded to study the effect of integrated pest management strategies in production of mite damage free nuts. The number of nuts with 5% damage, 10% damage and 25% damage was ranged between 24 to 34%, 32 to 48% and 24 to 41% in location I demonstration field [Fig-5]. The mite incidence was ranged between 24 to 34%, 32 to 48% and 20-34% respectively in demonstrations conducted at location II [Fig-6]. The application of neem cake along with recommended dose of fertilizers effectively reduced the perianth mite damage in coconut [10]. Balaji and Hariprasad, 2005 found that application Neem seed kernel extract 5%, Neem oil 3% and Neemazal 1% reduced the mite incidence [11]. The application of neem cake along with the organic amendments may have favoured the production of more number of 5% damage nuts and less number of 25% damaged nuts in the demonstration fields. The cost benefit analysis of present study recorded BCR and net return of 1.29 and Rs.13,800 in the demonstration and 1.17 and Rs. 6800 in the control plot [Table-1]. The above study was conducted for a period of one year in two blocks of Dharmapuri district. The above management practices are followed regularly the farmers can drastically reduce the disease affected trees and more quality nuts.



Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors

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Conclusion

The management practices viz., sowing of green manure crop sunhemp @ 50 Kg/ha, insitu ploughing of sunhemp on 40-45th day after sowing, Neem cake 5 Kg/tree along with *Pseudomonas fluorescens* @ 5Kg/ha and *Trichoderma viride* @ 5Kg/ha along with the incidence of *Ganoderma* wilt and root wilt. The application of neem cake along with organic amendments reduced the incidence of eriophyid mite.

Application of Research

The adoption of the demonstrated technology apart from reducing the pest *Ganoderma* wilt, root wilt and eriophyid mite also increases the income of the farmer. The application of above technology reduces the plant protection cost in coconut garden and also loss of 20 – 30 year old tree.

Research Category: Disease Management strategies

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